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EDITORIAL.

Cattle Grazing Grounds in Kelantan.

In some parts of the country cattle are required for padi cultivation work. During the period when the fields lie fallow, adequate grazing is usually found for the animals on the padi land, but for several months in the year, when the crop is growing, the animals have perforce to feed on the very inadequate pasturage of the homesteads, or on the roadsides. It is noticeable that in districts where cattle are numerous, they lose condition during this period.

This state of affairs has been recognized in most padi districts and in many instances areas have been declared grazing grounds by Government. But the mere Gazetting of an area as a grazing ground does not, in fact, create a grazing ground, so that in many cases little improvement has been effected in the condition of the animals despite the provision of areas over which they may graze.

In many padi growing districts, the absence or inadequacy of grazing ground is not serious by reason of the fact that there are but few cattle compared with the acreage of padi. In other parts of the country, however, this is not the case, as the area of land cultivated with padi is very large, and consequently the number of cattle per acre is also considerable. These conditions apply in particular to the northern part of the Malay Peninsula, and are nowhere felt more than in the State of Kelantan, with an area planted with padi of over 160,000 acres, and a cattle population of nearly 140,000.

During recent years serious consideration has been given in this State to the problem of providing adequate grazing for the months when the animals are precluded from using the padi land.

A statement of the problem as it applies to Kelantan, and of the investigations extending over some years designed to establish adequate grazing facilities in this area, is contained in an article in this number.

Many of these grazing reserves were covered with secondary growth. It was hoped that on felling this growth a natural generation of grasses would spring up. This, however, did not take place and investigations were therefore directed to the establishment by planting of suitable local grasses, or the introduction of imported grasses. The results were in favour of introduced grasses, of which carpet grass was found generally the most suitable for the conditions obtaining in this locality.

Consideration was also given to the methods and economics of planting, from which emerged a scheme which, although perhaps not ideal, is at least workable.

Fortunately for Kelantan, it is found that as the seasonal use of reserves for grazing is confined to about five months in the year, with co-operation from local headmen there is no serious risk of overstocking. Elsewhere we imagine that this might not prove to be the case and more drastic steps would have to be taken to protect the grounds from being over-grazed. On the other hand, under conditions such as exist in Kelantan, where grazing on reserves is seasonal, there is a risk of undesirable grasses suppressing the more desirable species. Maintenance of grazing

areas, therefore, is as important as their establishment. Patrol gangs are found useful for maintenance on such work as repairing fencing, cutting out regenerated bushes, and ensuring that parts of the reserve are not over-stocked. An economic system has not yet been evolved for such maintenance duties, but we would emphasize the importance of this work so that the grazing grounds may not rapidly deteriorate until they become useless.

We regard the work carried out in Kelantan towards the establishment and organization of grazing grounds as of first importance ; it provides a most useful guide for similar development in other parts of the country. The provision of grazing facilities must form an integral part of any of the new schemes for the extension of the area made suitable for padi cultivation where it is intended to work the land with cattle-drawn implements.

Methods of Harvesting Coconuts.

A perennial subject of discussion relates to the relative merits of picking nuts periodically, and the collection of nuts after they have fallen from the palms. Experiments described on another page in this number prove that on changing over from the system of nut collection to the system of natural nut fall, there is a temporary falling off in yield, but thereafter the number of nuts collected is unaffected by the method of harvesting.

The system of harvesting, however, must be governed by economic considerations. While consideration has not been given in the article to the relative costs of harvesting by the two methods, it is shown that the yield of copra obtained from the natural fall system is less than that obtained from nuts picked at a suitable stage of ripeness. The extent to which the percentage loss of copra at present prices can be made up by lower collecting costs must be left to individual estates to decide.

PICKING VERSUS NATURAL FALL IN COCONUT HARVESTING

By
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Introductory.

During the last trade depression various modifications in the method of harvesting nuts were initiated on many coconut estates as a measure of economy. On one estate the manager recorded the effect of leaving nuts on the palms until they fell naturally. Over a period of seven months it was claimed that the loss in crop amounted to some 50 nuts per acre.

In order to test the point, an experiment was laid down at the Coconut Experiment Station, Port Swettenham, in which numbers of nuts and outturn of copra from palms harvested monthly were compared with those from palms from which the nuts were allowed to fall naturally.

Details of Experiment.

Twenty-four pairs of adjacent palms, situated in different rows and which had given approximately equal numbers of nuts for a preliminary period of 3 years, were selected for the experiment ; high, medium and low-yielding palms were chosen to approximate a field population.

The palms are planted 30 ft. x 30 ft. square (48 palms per acre) and were between 12 and 13 years old on 1st July, 1936, when the experiment was commenced. Previously all the palms had been harvested monthly, bunches of nuts being picked on the first day of each month. Following the commencement of the experiment, nuts from one palm in each pair were allowed to fall naturally, those from the other palm being picked as before.

As regards the " picked " nuts, observations showed the average period elapsing between the opening of the inflorescence and picking to be about 12 months ; in the case of the " natural fall " nuts this period was extended to between 13 and 14 months, the greater proportion of the nuts falling after about 13 months. The nuts allowed to fall naturally were, therefore, between one and two months older than the " picked " ones.

In addition to recording the numbers of nuts collected monthly in both cases, copra was prepared from each nut collection and the weights of copra recorded.

With regard to the period elapsing between harvesting and the manufacture of copra, there was no delay with the " picked " nuts. In the case of the " natural fall " nuts, it was impracticable to manufacture daily and the nuts were allowed to accumulate until the beginning of the month following that in which they had fallen. From a practical point of view the crop of " natural fall " nuts in any month may be regarded as having been stored on the average for a period of 15 days before being made into copra.

Results of Experiment.

Table I shows that yield of the members of a pair was almost exactly equal when averaged for the three preliminary years (1933 to 1935) although there were rather wide variations from year to year, while the average for the last three years (1938 to 1940) shows a slight and insignificant bias in favour of the palms subjected to monthly picking. Yield of copra is, however, definitely in favour of the latter, whether expressed as total yield, yield per nut, or number of nuts required to produce one picul of copra.

Table I.

Comparative Yields of Nuts and Copra in Picking and Natural Fall Experiment.

Year	Picking at Monthly Intervals				Natural Fall (1)				Remarks
	Average No. of Nuts per Palm	Average Yield of Copra per Palm	Average Weight of Copra per Nut	No. of Nuts per Picul (2) of Copra	Average No. of Nuts per Palm	Average Yield of Copra per Palm	Average Weight of Copra per Nut	No. of Nuts per Picul of Copra	
		lbs.	lbs.			lbs.	lbs.		
1933	48.7	..	..	..	43.2	..	..	..	Preliminary years
1934	37.5 → 40.4	..	..	..	40.1 → 40.9	..	..	..	
1935	35.0	..	..	..	39.6	..	..	..	
1936	40.3	..	..	..	32.5	..	..	..	Intermediate years
1937	42.3	26.85	0.63	209.5	34.0	17.76	0.52	254.4	
1938	39.7	24.17	0.61	218.8	36.0	19.95	0.55	240.0	
1939	38.5 → 44.2	23.12 → 26.64	0.60 → 0.60	221.6 → 220.5	42.6 → 43.8	24.27 → 24.44	0.57 → 0.56	233.8 → 238.4	
1940	54.3	32.64	0.60	221.2	52.8	29.09	0.55	241.5	

Notes—
(1) Ripe nuts allowed to fall naturally as from 1st July, 1936.
(2) The figures have been calculated from the total yields of nuts and copra. One picul=133 1/3 lbs.

Previous investigations have shown that yield of copra is affected both by the condition of the nuts on harvesting, also the period elapsing between harvesting and manufacture into copra ([1 & 2]). Under the humid atmospheric conditions normally prevailing in Malaya, ripe nuts tend to germinate rapidly with a corresponding reduction in yield of copra.

While germination is primarily associated with period of storage of nuts or delay between harvesting of nuts and manufacture of copra, it may also occur while the nuts are still on the palm. In order to test this point a daily census of nuts was instituted during the latter half of 1939 and continued during 1940. Each fallen nut was examined and classified according to the length of plumule.

The results given in Table II show that averaged over the year 28.1 per cent. of nuts germinated on the palms. From month to month there were wide variations which cannot be correlated with rainfall, as witness the figures for April and July, May and November. Specific examination of " picked " nuts was not carried out, but long experience on the Station has shown that germination of such nuts is negligible, the proportion being less than one per cent.

From the practical point of view this experiment indicates that long continued natural fall would not result in appreciable diminution in number of nuts but would cause a loss of copra, even if collections were carried out at frequent intervals and nuts were neither overlooked nor stolen. The reduced yield of copra can be attributed to germination taking place in the nuts both on the palms and during storage. Based on the yields from the palms harvested monthly, the figures for the last three years of the experiment indicate a loss of between 7 and 8 per cent.

Intermediate Period.

The great decrease in 1936/37 (commencing with the change over on 1st July, 1936) in numbers of " natural fall " nuts is of considerable botanical interest and may be further examined by setting out quarterly yields, see Table III.

In view of the fact that " natural fall " nuts remained on the palms for about a month longer than the " picked " nuts a decrease of " natural fall " nuts in the first quarter after the change, followed by a return to equality, was to be expected.

Table II.

Condition of "Natural Fall" Nuts at Time of Falling.

Month	Total Nuts	Not Germinated	Germinated				Proportion of Germinated to Total Nuts	Monthly Rainfall
			Plumule less than 2 ins.	Plumule from 2 to 4 ins.	Plumule more than 4 ins.	Total		
1940							per cent.	ins.
January	138	85	17	2	34	53	38.4	5.88
February	78	46	16	4	12	32	41.0	7.04
March	69	45	15	4	5	24	34.8	6.75
April	49	29	6	4	10	20	40.8	3.58
May	77	52	13	2	10	25	32.5	12.96
June	135	89	13	10	23	46	30.1	7.32
July	113	102	2	3	6	11	9.7	3.17
August	131	108	8	4	11	23	17.6	7.32
September	148	128	13	2	5	20	13.5	7.28
October	120	95	17	2	6	25	20.8	7.75
November	120	83	25	6	6	37	30.8	11.40
December	89	49	21	4	15	40	44.9	9.27
Total	1,267	911	166	47	143	356		
		per cent.	per cent.	per cent.	per cent.	per cent.		
Proportion of Total Nuts		71.9	13.1	3.7	11.3	28.1		

Table III.

Quarterly Yields of "Picked" and "Natural Fall" Nuts.

Year	Quarter	No. of "Picked" Nuts	No. of "Natural Fall" Nuts *	Difference (based on "picked" nuts)	Balance on Year
1933	First	129	95	+ 34	
	Second	275	228	+ 47	+132
	Third	433	434	— 1	
	Fourth	331	279	+ 52	
1934	First	169	198	— 29	
	Second	161	179	— 18	— 62
	Third	330	341	— 11	
	Fourth	240	244	— 4	
1935	First	117	161	— 44	
	Second	172	194	— 22	—110
	Third	300	337	— 37	
	Fourth	251	258	— 7	
1936	First	175	196	— 21	—29 (half-year)
	Second	218	226	— 8	
	Third	346	188	+158	+211(half-year)
	Fourth	229	176	+ 53	
1937	First	139	216	— 77	
	Second	242	132	+110	+200
	Third	386	243	+143	
	Fourth	248	224	+ 24	
1938	First	174	199	— 25	
	Second	233	182	+ 51	+ 90
	Third	329	261	+ 68	
	Fourth	218	222	— 4	
1939	First	145	179	— 34	
	Second	185	273	— 88	—100
	Third	346	360	— 14	
	Fourth	248	212	+ 36	
1940	First	232	286	— 54	
	Second	263	261	+ 2	+ 35
	Third	458	392	+ 66	
	Fourth	350	329	+ 21	

* Ripe nuts allowed to fall naturally as from 1st July, 1936.

Examination of the quarterly yields shows that there was a relatively large decrease during the first quarter (July to September, 1936) which was followed by a further marked decrease during the second quarter (October to December, 1936). While the first decrease was normal, the second is considered abnormal. During the third quarter after the change (January to March, 1937) there was a marked increase ; this was followed by a persistent decrease during the next three quarters (April to December, 1937), the decreases during the fourth and fifth quarters after the change (April to September, 1937) being particularly large. Both the increase and the persistent decreases during 1937 are abnormal. Since 1938 yields have returned more or less to equality.

It is possible to calculate from the 14 preliminary quarters (January, 1933 to June, 1936) what difference of yield averaged over any 5 consecutive quarters would be significant, assuming no differential factors to be introduced. The difference found from October, 1936, to December, 1937, exceeds this figure and it is reasonable to conclude that the change over to natural fall did in fact affect yield. Neither theft nor oversight of fallen nuts is likely under the conditions of the experiment and it is still less likely that either of these factors should have operated for the period under review and not later.

It would appear that retention of nuts on the palm for a longer period than that to which the palm has become conditioned causes retardation of maturity and reduction of nuts matured for rather more than one year.

Summary.

An experiment designed to compare numbers of nuts and outturn of copra from palms harvested monthly and those from which the nuts are allowed to fall naturally is described.

2. The results indicate that while there is a temporary reduction in nuts matured following the change over, long continued natural fall does not result in appreciable diminution of the crop.

3. The reduced yield of copra from nuts allowed to fall naturally can be attributed to effects of germination.

References.

1. Cooke, F. C. The Harvesting of Coconuts for Copra Production in Malaya. *Malayan Agricultural Journal*, Vol. XIX, No. 10, October, 1931, page 477.
2. Cooke, F. C. The Storage of Coconuts after Harvesting. *Malayan Agricultural Journal*, Vol. XX, No. 1, January, 1932, page 5.

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DEVELOPMENT OF CATTLE GRAZING GROUNDS IN KELANTAN

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Introduction.

In Kelantan cattle play a very important part in the cultivation of the padi land, and probably upwards of 90 per cent. of the planted acreage is cultivated annually by animal labour. The remainder comprises deep land such as alors * where it is impossible for cattle to work, and where in any case little cultivation of the soil is required owing to its being inundated by water for the greater part of the year. In addition to these alors,* there are small areas of land, principally in Ulu Kelantan, where a simpler method of padi planting prevails, and such cultivation as is done is performed by hand.

The great bulk of the padi land in Kelantan is to be found in the coastal plain, an area of about 1,000 square miles, of which by far the greater portion is relatively high and unirrigated, and dependent upon rainfall for its water supply. Retention of rainwater on this land is largely achieved by having well-made bunds to prevent surface run-off, and by thorough cultivation of the land, particularly with harrows, which so puddle the land as to form a relatively impermeable layer which holds up the percolation of water through the soil.

On the highest land, dry padi is commonly planted rather earlier in the year, before the arrival of the monsoon rains, and for this type of padi thorough cultivation of the land is equally desirable, but in this case with the object of rendering the soil open and friable.

Whichever method of planting is practised, demands on animal labour are heavy, and the latest available figures show that in 1940 the State had 137,090 head of cattle (oxen and buffaloes of all ages) for an area of 163,940 acres of padi land planted in the 1939-40 padi season, a rate of one head to about every $1\frac{1}{4}$ acres of padi land.

Such a large cattle population presents a serious feeding problem, for while padi land affords fair grazing between March and August each year, this is denied to the cattle for the remainder of the year when the land is under a padi crop. To overcome this difficulty, the Kelantan small-holder tethers his cattle on any small areas of grazing that may be available in the vicinity of his house, or on the roadsides, or he himself may cut grass from the bunds in padi land where cattle cannot graze. In some localities there are organized herd movements to high land, safe from floods, but of such low fertility that it is not cultivated and exists as a mixture of scrub and poor grazing.

The account which follows describes the preliminary results of experiments and work done on the development and establishment of grazing grounds, one of the methods of improvement in cattle feeding on which work is in progress in Kelantan.

Establishment of Grazing Grounds in Kelantan.

Since the formation of the Department of Agriculture in Kelantan in 1931, opportunity has been taken to effect reservation by Notification, of areas of State land in each District for the purpose of Cattle Grazing Reserves. About 15,000 acres have thus been formally reserved for this purpose, and other areas are awaiting reservation. This land remains the property of the State, and no charge is made for its use as grazing land.

* Beds of former streams or creeks with, normally, soil of an organic nature.

As is to be expected in a State where the human population exerts a heavy pressure on the land, the areas of State land available for possible reservation as grazing grounds are those very areas which, by reason of their situation or soil type, are of the least value or interest to the small-holder, and it follows, therefore, that as grazing land they present many opportunities for development and improvement.

Since 1935, funds have been available, initially for experimental work on grazing ground development, but more recently for the opening up of reserves on those lines that have been found the most satisfactory.

Types of Grazing Ground.

The range of conditions met with on grazing grounds is a very wide one. Some areas comprise little more than an almost sterile white coastal sand, extremely hot and arid during the dry weather and supporting a sparse growth of bushes and clumps of fibrous grass. Their small utility is limited to the duration of the North East monsoon, when some leafy growth is made by the grass, and they therefore serve a useful purpose, for it is during that period that grazing is most needed.

The inland areas fall into several fairly well-defined classes:—undulating foothills, river valleys, old padi land, and swamps. Of these the first mentioned is the most important; old padi land and swamps are liable to be flooded deeply at the time when they are most needed, although for a good portion of the time the swamps give a useful quantity of cut fodder obtained from aquatic grasses, among which may be mentioned the wild rice *Oryza fatua.*

Outline of Experimental Work.

The need for a planned programme of work in connexion with grazing ground development became apparent very soon after the first attempts were made to clear inland foothill reserves, covered at the time with secondary jungle. In the case of the heavier secondary jungle, grasses were not represented to any appreciable extent in the flora, and the rapid establishment of desirable species for grazing could not be expected. After clearing, the land rather quickly became overgrown with young tree seedlings and sprouts from live stumps, and without any intermediate colonization by grass reverted to bush growth which is more difficult to clear a second time. The results from cutting the lighter secondary growth were no less unsatisfactory, for the less desirable grasses (*lalang* and *riong*) were already present and, on clearing, these spread to the virtual exclusion of others, accompanied also by bush regeneration. In neither case was there any prospect of the development of good natural grazing within a reasonable time, and it was clear that a grass, local or imported, would have to be selected and introduced into the area.

The best means of planting the grass, whether by seed or cuttings, had to be determined, as well as the most satisfactory times of year for felling, burning, and planting the area.

Selection of Suitable Grass.

Studies of the grasses appearing naturally on existing grazing land, and the collection of information on their value for grazing, were conducted simultaneously with a small scale trial of imported species, with the object of finding a grass well suited to the reserves situated among the foothills on a rather poor quartzite soil. The requirements were for a hardy grass, capable of maintaining itself in competition with other species; easily planted and established; preferably of a creeping nature so as to avoid bare patches and affording the maximum of cover to the soil; having a high resistance to drought and possible over-grazing; tolerant of poor soil conditions and yielding a good bulk of palatable fodder.

Small scale trials were conducted with the following varieties, some of which were imported for the purpose : Dallis grass (*Paspalum dilatatum*), Rhodes grass (*Chloris Gayana*), *Stenotaphrum secundatum*, *Phalaris tuberosa*, Wallaby grass (*Danthonia* sp.), Tall Oat grass (*Avena elatior*), Carpet grass (*Axonopus affinis*), *Rumput pahit* (*Paspalum conjugatum*), Blue Panic (*Panicum antidotale*) and various fodders such as Guinea grass (*Panicum maximum*), *Tebu salak* (*Coelorrachis glandulosa*), Mauritius grass (*Panicum muticum*), and a few legumes such as lucerne and Egyptian clover (*Trifolium Alexandrinum*).

Of the grasses mentioned above, carpet grass was found to be outstanding, and a great improvement over the local grasses which it commonly crowds out on the poor quartzite soils. *Kemunchut* or love grass (*Chrysopogon aciculatus*) is probably its nearest rival on poor dry soil, but it has not the same degree of drought resistance, nor does its yield approach that of carpet grass. Since 1936, carpet grass has been the standard grass for planting on the inland foothill reserves, and its performance has fully justified the choice.

A recent trial of *rumput pahit* (*Paspalum conjugatum*) on inland quartzite has shown that this species, which is useful on the richer and moister river valley soils, has a poor rate of recovery after grazing, and tends to die out. This weakness may be accentuated by a possibly higher palatability than the surrounding carpet grass. Under dry and exposed conditions, it departs from the leafy prostrate form in which it is found in the shady *kampong* land and assumes a more erect habit with fewer leaves, and with wiry stems which are liable to die back to the roots after grazing.

Planting Methods.

Speed and reliability are required in planting, partly on account of cost and partly on account of the rather limited period of the year during which there is sufficient rainfall to ensure establishment.

Two methods of planting have been tried ; by seed and by cuttings. The seed may be either broadcast or dibbled, and the cuttings dibbled.

Seed has the advantage that it is easy to collect, and comparatively rapid to sow by hand. This enables a greater area to be covered in the short planting season. A small scale trial showed that labour requirements for seed collection were about 5.7 men days per acre, and for sowing about 15 men days per acre, or a total of 20.7. But the speed of planting is offset by the unreliability of germination, the depredations of crickets, which tend to be numerous on newly cleared jungle and eat off the blades of the young grass, and the uncertainties of the weather, particularly as a heavy rainstorm may wash away or destroy a large proportion of the seed or seedlings. It is thus highly probable that any initial savings will be lost on account of the cost of extensive supplying. Moreover, unless this supplying has been decided upon and completed before the end of the same planting season, it is probable that a whole year may be lost before the land can be grazed.

The alternative method of using cuttings is eminently reliable at the most favourable time of year, but it is slower, and about 36.4 men days per acre planted are required for pulling up the cuttings (or divisions) from the nursery, trimming to six or eight inches in length, carrying to the land to be planted, and planting. A further disadvantage is that a nursery for the supply of cuttings must be laid down close to the area to be planted at least a year before any extensive planting can be undertaken, for cuttings are far too bulky to be carried more than a very short distance.

There is no doubt that an improvement in planting methods is needed. Early experiments using dry padi as a nurse crop and interplanting grass seed were unsuccessful, but it seems that this may still hold useful possibilities, and that further

investigation might show that a suitable combination of the date of padi planting, age of padi at time of interplanting, and the time of year when viable grass seed is easy to harvest, could be attained. Alternatively the natural establishment of herbaceous annuals with wind borne seeds, which commonly follows rapidly the burning off of the felled timber, might be turned to a useful purpose by providing a nurse crop for the grass seed.

Clearing and Planting Seasons.

The times of year to be selected for clearing and planting are of importance from the point of view of the success of these operations and the availability of labour. Broadly speaking, the rainfall in Kelantan is very heavy during the North-East monsoon from October to the middle of January; very little is experienced between February and May; and light showers become more frequent from June onwards until some time in October when the heavy rain commences. Padi planting from July to November, and harvest from January to the end of March make heavy demands upon labour, and during these periods the supply of labour tends to be irregular.

Where a permanent gang is not employed on a reserve, it has been found satisfactory to commence felling as soon as the padi harvest is completed, but care has to be taken to keep the area felled within a very definite limit. This limit is the amount that one can be certain of burning, clearing up and burning a second time, and planting, with a labour force that tends progressively to diminish during the later part of the year. Planting is particularly difficult, for the wet weather when this can be done most successfully is not of long duration, and labour is apt to be scarce. Moreover it accounts for well over half the labour requirements for opening up a reserve of the Kelantan inland type. Uncompleted work from the previous year is troublesome later.

Methods adopted for Clearing an Inland Reserve.

At least a year before the commencement of development of grazing land, provision has to be made for the supply of planting material, and for this purpose a carpet grass nursery is laid down at a suitable place on the reserve. The site should be rather low lying, to take advantage of the generally higher fertility of such spots, and to ensure equable moisture supply; the land, however, should not be liable to flooding. As a rule, neither manuring nor extensive cultivation is required though weed growth and sprouts from stumps will require attention particularly in the early stages after planting. Light overhead shade is advantageous, for the grass then assumes an erect habit with rather long leaves which greatly facilitate the removal of the divisions when planting material for the grazing reserve proper is required. The nursery should be fenced if there is any danger of stray cattle. Planting at one foot by one foot with cuttings will, on the better soils, ensure planting material being available for use a year later, but with wider spacing or less good soil it may be necessary to allow rather longer.

Felling is commenced when labour becomes available after padi harvest, and in order to avoid a long carry should in the case of a new reserve, proceed outwards from the nursery. In subsequent years, appropriate areas of nursery reserve, in no way specially treated, are fenced off from the main area adjacent to the land to be developed the following year, and after utilization in that year they become ordinary grazing. When felling, the larger trees are left for shade for the cattle, the accompanying illustrations show the approximate number left standing. In addition to the benefit to the cattle, shade facilitates the establishment of the carpet grass, and also provides conditions to which the better indigenous grasses (such as *rumput pahit*) are suited.

Secondary jungle of a type common on inland reserves. Six-week old dibbled carpet grass in foreground.

Established grazing land planted with carpet grass two to three years ago. Trees are left for shade; fencing provided for the control of grazing.

Five- to six-year old grazing with shade being increased by controlled stump regeneration and planting.

Carpet grass 2½ months after dibbling with runners beginning to spread.

After felling, the area is burned. This disposes of the bulk of the branches and most of the smaller trees. In addition to the larger trunks, which are ignored so long as they are unlikely to prevent access of cattle to any part of the land, there is a variable quantity of material such as the straggling stems of the *mempelas* (*Grewia umbellata*) which impedes planting work and subsequent maintenance, and is therefore removed by handwork and burnt.

In the few weeks prior to planting, it is common to experience a rather heavy growth of herbaceous annuals and some colonization by *riong* grass (*Phragmites sp.*). These are of small importance, although the *riong* grass usually requires eradication later to prevent it becoming too firmly established before the carpet grass allows of grazing. If the original vegetation has been light bush growth only, the probability is that *lalang* grass will also be present, and where grazing is intended to be seasonal only, following a year for the establishment of the carpet grass, it is generally advisable to remove small centres from which it may spread.

Commonly in the inland areas, no grass is represented in the flora of the jungle, and if it is, it may be of an unsuitable type for grazing, and more or less extensive planting of a suitable type is needed. Mention has already been made of possible methods of planting carpet grass, and the nursery necessary for the supply of planting material. The great bulk of the planting in Kelantan has been done with cuttings in the following manner.

As removed from the nursery, the cuttings of carpet grass may be a foot or more in length, but before planting they are cut to a length of six or eight inches. These may be planted by dibbling with a stick, but a rather better and quicker method is with a *changkol*. With one blow an opening can be made in the ground; the labourer following inserts a few cuttings and tamps the soil down with his foot. It has been found unnecessary to cultivate or manure the land before planting, and in view of the rather wide spacing adopted (two to three feet each way) it is desirable to leave harmless herbaceous annuals to provide some cover for the soil.

Following planting, some maintenance work has to be done. *Lalang* and *riong* may require some attention, and unwanted growth slashed back from stumps. Three particularly vigorously growing bushes in secondary jungle usually call for repeated attention; *kedudok* (*Melastoma* sp.), *kemutong* (*Cratoxylon* sp.), and *kemunting* (*Rhodomyrtus tomentosa*), of which the last two are capable of regeneration from the smallest piece of root, and if left unchecked soon cause deterioration of the pasture. Very little experience has been gained with the use of goats at this stage in the development of a grazing reserve, but such observations as have been made suggest that they are little interested in the newly planted carpet grass, and devote much of their attention to the young growth from regenerating bushes.

Fencing is required both for the purpose of protecting the newly planted areas from cattle and for dividing the land into sections for rotational grazing. Jungle saplings tied with rotan are conveniently obtained, but do not last for very long. It is possible that *kedondong* (*Canarium sp.*) could be used as a live fence, as this is a tree commonly employed as a support for *sireh* in Kelantan, and frequently seen in the homestead fences where it is planted as a substantial post with a turf on the top to encourage rooting and sprouting. It appears to be very resistant to maltreatment and poor soil.

Labour requirements for a typical inland reserve from the start of felling to the completion of planting total about 67 men days per acre when planting by cuttings, the details for the individual operations being as follows: cutting rentice 0.5, felling 14.3, burning 0.2, *perun* and second burn 15.5, pulling up carpet grass cuttings 9.2, planting carpet grass cuttings 27.2. Including 10 per cent. extra for supervision, the cost at present rates of pay amounts to about $35 per acre, to which has to be added a small charge for fencing and maintenance for a year until the land is fit for grazing.

Development and Improvement of other types of Reserve.

In many ways the more fertile river valley reserves present a less difficult problem. The damper and more fertile localities tend to be readily colonized by the better local grasses, and if planting has to be undertaken it can be successfully performed during a greater part of the year. On the other hand, with the markedly seasonal grazing that is a feature of all the Kelantan reserves, maintenance is a much more expensive matter if the area is not to be allowed to revert to bush growth. This type of reserve is however rare.

Little progress has been made with reserves on the *bris* land (coastal sand) where xerophytic conditions favour the growth of clumps of fibrous grass and small trees. Spineless cactus imported from South Africa were tried as a possible fodder for these regions, but none of the six varieties introduced has yet shown any promise on either this or more fertile land.

Attempts to improve the conditions on existing inland reserves have included tree planting to increase the amount of shade and interplanting of the existing pasture with carpet grass, particularly in the poorer areas. Carpet grass has a fair ability to spread naturally by means of seed, and once introduced and established it is likely to increase steadily without further attention.

A related problem, still under investigation, concerns an extensive reserve to the west of the Kelantan river, where the protein and mineral content of the pasture is too low to maintain stock in good condition, but in this case a solution does not seem to lie in the type of grass grown.

Maintenance and Management of Reserves.

The seasonal use of reserves for grazing for roughly five months in the year, during which time the grass is growing most vigorously, largely avoids any serious risk of permanent damage from overgrazing the foothill reserves, provided that, with the co-operation with the local headmen, a fair measure of control is exercised over the number of cattle allowed to graze. On the larger reserves where development is still in progress, the man in charge of the gang is able to keep a check on stocking, and to see that when the grass is well grazed down in one partition the cattle are moved to another.

Kelantan cattle are generally good close grazers, and little trouble is experienced from selective grazing. The almost complete suppression, if not eradication, of *lalang* grass from the side tables of the roads as a result of grazing is in marked contrast to many other parts of Malaya where the cattle population is lower.

In the case of grazing reserves reasonably free from *lalang* grass in the first place, five months of grazing per year is just sufficient to keep this grass under control, but where *lalang* grass has been firmly established for some time, it appears to be insufficient to prevent it from spreading during the padi off-season, particularly where the intensity of grazing has been intentionally light on account of a poor soil or the comparatively recent establishment of the pasture. It is questionable, however, whether the *lalang* grass is of any importance so long as it does not attain dominance in the flora; sporadic patches may be ignored unless the finer turf grasses show signs of dying out. This is preferable to an attempt at complete suppression by lengthening the grazing season, or by indulging in extensive hand eradication.

Some form of patrol gang at the rate of about one man to every 25 acres has been found useful for maintenance work throughout the year for repairing fences and cutting out regenerating bushes. From time to time attempts have been made to induce cattle watchers, who bring herds up to a reserve for the day, to undertake some of this maintenance work during the grazing season, but without success, probably on account of the fact that they are not the actual cattle owners but only

temporary paid herdsmen with little personal interest in either the stock or the grazing.

A communal effort by the villagers is resorted to occasionally, when several hundred may turn out for a day's work, at the completion of which they take part in a feast. The results can be spectacular, but without careful organization such exertions are liable to lead to a large area being half done, and none properly completed.

Summary.

1. The need of communal cattle grazing grounds in Kelantan, and the methods by which they have been provided, are discussed.

2. On the commoner types of grazing reserve in Kelantan the establishment of good grazing has not occurred naturally, and a planned programme of development has been found essential.

3. Comparison of local grasses with imported species showed carpet grass (*Axonopus affinis*) to be most useful for inland quartzite soils.

4. Methods of planting carpet grass on a large scale are discussed.

5. An account is given of the procedure followed for the development of grazing land from light secondary jungle, and its subsequent maintenance.

6. Notes on preliminary work on the improvement of existing reserves are given.

Acknowledgments.

The assistance and advice received from members of the Department of Agriculture, Straits Settlements and Federated Malay States, are gratefully acknowledged, and appreciation is expressed of the work and records of Mr. J. A. Craig who initiated these investigations, and Mr. R. G. Heath in whose hands the work was continued for three years. Thanks are also due to Che Ja'afar bin Mampak who was responsible for many of the field records.

Reference.

Craig, J. A.—Agriculture in Kelantan. *Malayan Agricultural Journal*, Vol. XXIII, No. 8, August, 1935, page 369.

Received for publication 12th August, 1941.

QUARTERLY REPORT ON THE MALAYAN PINEAPPLE CANNING INDUSTRY

June to August, 1941.

Prepared by the Economics Branch of the Department of Agriculture, S.S. & F.M.S., from Reports of Field Officers.

Factories.

There are now 19 registered factories in Malaya, 4 of which are peeling sheds. This total is made up as follows :—Singapore 5, of which one cans juice only; Johore 8 factories and 3 peeling sheds; Selangor 3 of which one is a peeling shed.

The 4 Singapore pineapple canning factories have worked during the quarter, but one for a very brief period. At the end of the period one only was in operation.

In Johore, 3 factories were operating at the beginning of the quarter, one working part time only. All factories were closed during the third month of the quarter. The manufacture of jam was begun at one factory. Sales were sufficiently encouraging for steps to be taken to increase the output. Interest was also shown in the canning of vegetables at the same factory.

No canning was carried out in the Selangor factories during the period.

Prices.

During this period there was no change in the prices of the canned product as fixed by the Central Board.

In the field fresh fruits were still commanding depressingly low prices. In Johore 40 to 50 cents per hundred was paid for good quality fruit. In Selangor some of the crop was harvested to be sold as fresh fruit at prices ranging from $1 to $1.50 per hundred.

A revised scale of payments for fruit at the factories came into force on the 1st August. The present rates are as follows :—

Class of Fruit	Average Weight of 100 fruit	Price for every 100 Fruit less than Half-ripe			Premium for every 100 Fruit at least Half-ripe
		Johore and Klang	Singapore		
			Kranji.	Serangoon and Grove Road.	
	lbs.	$	$	$	cents
1½ lbs. to 2½ lbs.	200	.71	.82	.88	10
2½ lbs. to 3½ lbs.	300	1.07	1.24	1.32	20
Over 3½ lbs.	400	1.44	1.66	1.77	40

At a Trade Committee Meeting held on 24th July, 1941, it was agreed that the scale of prices which had been in force since November, 1939, for the civilian market should also apply to purchases by the Ministry of Food but with a special discount of 4 per cent. (to the nearest 5 cents). It was also agreed that the prices for H.A.Q. (Higher Average Quality) grades should be worked at a rate of 12 cents per case higher than G.A.Q. grades (with a 4 per cent. discount on sales to the Ministry).

At this meeting it was also decided that a premium should be paid for the riper fruit, and hence the allowance for fruit content would be increased to 64½ cents out of a current minimum price of $4.76 per case. Payments into the growers' pool which has been operating since January, have consequently been discontinued.

Production and Sales.

Exports of Malayan canned pineapples for the three months subsequent to those quoted in the last quarterly report were as follows :—April 1,298 tons, May 3,160 tons, June 779 tons.

The whole of the quota of 500,254 cases, fixed for the season 1st April to 30th September, was released. In addition permission was given for the packing of 220,000 cases under the Growers' Packing Scheme, during the quarter under review.

Government Research Station and Canning Factory.

Pineapple Juice.—Experimental work was carried out to investigate the possibility of removing the sediment from pineapple juice or of keeping it in suspension. Cloudy unfiltered pineapple juice is required by the market, but the sediment which is formed during the processing and which quickly settles out is unattractive. Investigations showed that the bulk of the sediment is formed when the juice is heated between 150° F. and 160° F., and that a heavier and more copious sediment is formed in juice pressed from unripe fruit than from ripe fruit. Fresh juice after passing through a centrifuge produced a sediment after processing which settled out comparatively slowly, the centrifuging had the added advantage of removing any dirt or grit as well as a proportion of the solid matter present; homogenising fresh juice had the effect of keeping the sediment in suspension longer than for untreated juice. These results indicate that some measure of dispersion of the sediment can be effected by mechanical treatment of the cold juice.

The process extensively used in Europe for sterilizing fruit juice by means of a sterilizing filter was tried for pineapple juice. The cold fresh juice expressed from selected ripe pines was first strained through muslin to remove the larger solid particles and was then passed through a Seitz E.K. cold sterilizing filter under a pressure of 22 lbs. per square inch straight into sterile bottles which were immediately closed with sterile crown corks, no heat treatment of any kind being employed. A sparkling clear juice was obtained with the true fresh pineapple flavour. The most difficult part of this process is maintaining the filter, bottles, and all equipment in a sterile condition, as any infection entering the bottles or the juice between the filtering and the closing of the bottles causes fermentation.

Packers now peel their pineapples before pressing for juice as it was found that any green skin left on the fruit gives the juice a dark appearance and an unpleasant flavour. It has been found that if this method is employed, the careful blending of juices from fully ripe and underripe fruits can improve the flavour; 25 per cent. to 50 per cent. juice from unripe fruit may be added with advantage. It has been established as a result of observations and canning trials that by carefully selecting the pines the flavour of the juice may be greatly improved. Fruits fully ripe with bracts of a pinkish colour produce the best flavoured juice ; care must be taken to exclude all overripe or bruised fruit, which can usually be detected by smell. Various methods of extracting juice from selected pines were investigated. Whole red ripe fruit when pressed unpeeled gave the best flavoured juice so far produced, but it is essential that all pines pressed whole should be fully ripe with no trace of green on the outside. The flavour of juice pressed from whole ripe fruit was far superior to juice pressed from fruit of the same ripeness but peeled before pressing, a more pronounced pineapple flavour resulting from the inclusion of the ripe peel during pressing. A recovery of 41.5 per cent. by weight was recorded for whole fruit against a recovery of 27.1 per cent. for peeled fruit. These results indicate that the careful selection and pressing of whole fruit would be advantageous. Whole fruits chopped and minced in varying degrees prior to pressing indicated that coarse chopping of the fruit does not effect the flavour, colour or yield and would

probably facilitate pressing, but it was noticed that the finer the fruit was minced the darker the juice became with corresponding falling off in flavour.

Pineapple Jam.—The commercial production of pineapple and papaya jams with lime and ginger flavourings has been in full swing ; samples were tested regularly at this Station and a very consistent and high standard of quality was maintained. Some 5,000 cases of 72 1 lb. tins per case were ordered to be shipped to England on behalf of the Ministry of Food. Locally produced pineapple jam is now on sale at the majority of the principal grocers in Malaya.

Dried Pineapple.—As a result of enquiries as to the possibility of drying pineapple slices, an improvised tunnel drier was constructed and experiments carried out. Freshly cut pineapple slices were subjected to a hot air blast in the drier, the temperature starting at 130° F. and being raised to 160° F. during the first two hours, the temperature then being maintained at 160° F. After six hours the slices were found to be dried to approximately 20 per cent. moisture content. The appearance, flavour and smell were satisfactory but it was noticed that brown spots appeared at any point where the slice was slightly bruised or in places adjacent to any diseased area. This necessitated the rejection of a large proportion of the slices. It was found that by soaking the fresh slices overnight in a solution of sodium bisulphite containing 1 per cent. sulphur dioxide, the occurrence of the brown spots was eliminated and at the same time the appearance of the dried slices was improved, their colour being a brighter, fresher yellow. These slices when soaked in water returned to normal shape and size, but it was found necessary to boil them with some sugar for 20 to 30 minutes to remove all traces of sulphur dioxide flavour. The slices then resembled canned pineapples. It was found that dried slices if stored in the open in Malaya gradually absorbed moisture, which in turn promoted mould growth. For this reason dried pines will have to be packed in airtight containers ; samples packed in 4-gallon kerosene tins with airtight press-on lids have kept perfectly. It was found that one 4-gallon kerosene tin could contain a quantity of dried slices which had they been canned in the usual way would have filled 150 1½ lb. tall cans : this represents a saving in shipping space of approximately 600 per cent.

Vacuum Syruping Process.—References have appeared from time to time in American publications to a process which is employed successfully in Hawaii for packing pineapples. The tins containing the cut fruit are subjected to high vacuum for a few seconds, the syrup being added to the cans before the vacuum is released, and the cans being then closed on a vacuum double seaming machine. It was decided to try out this process on Malayan pineapples and a suitable experimental apparatus was fitted up. The preliminary tests gave most satisfactory results, the improvement in the colour of the fruit, especially of the lower grades, was most marked. Canning trials were carried out to compare the improvement in colour using the vacuum process described above with the water exhaust process and with no exhaust at all, the colour of the fruit being judged by comparison with a standard colour scale. The vacuum process was found to give a greater improvement in colour and appearance than any process previously tested and as the fruit is not heated at all before closing, the flavour is absolutely fresh. This process gives the fruit a translucent appearance and almost entirely eliminates the white markings common in most canned pineapple.

Chemically Preserved Pineapple.—Further experiments were carried out on the chemical preservation of pineapple crush and juice for bulk shipment. Samples were successfully preserved by the addition of quantities of sodium benzoate and sodium bisulphite within the quantities permitted by the Sale of Food and Drugs regulations. Preservation with sodium bisulphite is the cheaper method and would be quite suitable for preserving crush, where it will subsequently be cooked, as in jam-

making, the flavour of the sulphur dioxide being thus removed. Where the product is not to be heat treated, as in the case of juice, sodium benzoate would be a suitable preservative.

General.

Restricted canning operations and transport difficulties are combining to hasten the abandonment of pineapple lands by the squatters. In Johore even those lands which are still capable of producing fruit of average size and quality are no longer being maintained in a clean condition, and secondary jungle and *lalang* grass are gradually becoming established. No definite figure can be given of the area of land abandoned but it is probably not less than 10,000 acres. In Singapore, although fruit is still harvested from some of the newer pineapple areas, most of the older ones have now been abandoned. Some of this land has lately been planted with vegetables. In Selangor, also, some pineapples have been cut out in all areas and food crops planted in their place. In some cases where pineapples were interplanted with rubber they have now been cut out.

Ample fruit supplies were available everywhere but owing to restricted markets a portion only could be sold. In Singapore about 40 per cent. of the mid-year crop remained unharvested. In Selangor where the harvest is now over, much of the crop has rotted in the fields. In Johore it is estimated that 60 per cent. of the crop remained unharvested. Canneries showed discrimination in their purchasing and discarded all fruit under average size and quality. It has been reported that 30 per cent. of deliveries were discarded on this score.

Review.

Vegetable Gardening in Malaya.

By J. N. Milsum and D. H. Grist. Published by the Department of Agriculture, S.S. & F.M.S., and printed by Kyle, Palmer & Co. Ltd., 206 pp. and indices. 96 illustrations. 1 graph. 1941. Price $2 (Malayan currency) or 4s. 8d. post free.

The former publication of the Department of Agriculture on this subject, " The Culture of Vegetables in Malaya " by Bunting and Milsum has been out of print for some time. The appearance of this new book is, therefore, doubly welcome at this time when everybody should grow as much vegetables as possible, either for his own use or for sale, so as to reduce Malaya's dependence upon imports from abroad.

The book, which runs to some 200 pages, is attractively got up, with a gaily-coloured dust-cover to catch the eye of the purchaser. It is well printed and plentifully illustrated.

The greater part of the volume is given up to a detailed account of each separate vegetable, under the sub-headings of description, propagation, cultivation, and uses. This part is divided into six separate chapters dealing respectively with legumes, tubers and roots, gourds and pumpkins, salad and fruit vegetables, leaf and stem vegetables, and flavouring and seasoning herbs. The particulars given provide all the ordinary information that could possibly be desired.

A valuable feature is the inclusion of a list of the names and addresses of seed-merchants in various parts of Malaya, with special emphasis on suppliers of locally-grown seed, and of seed imported from China. The Chinese market-gardener is acknowledged as a past-master in the growing of vegetables, and although some of the cultural methods upon which his success depends, are, rightly, not such as commend themselves to European consumers of uncooked vegetables, his success is also in no small measure due to the kind of seed which he uses. A useful adjunct to the would-be purchaser of such seed from dealers speaking no English and perhaps no Malay, is the list of Chinese (and other vernacular) names of locally-grown vegetables, which is printed at the end of the book.

There is a separate chapter dealing with Chinese methods of market gardening. There are also chapters dealing specially with vegetable gardening in the lowlands, and in the highlands of Malaya, and on organised vegetable production on estates, allotments, etc.

The remainder of the book consists of chapters on matters of general concern to all vegetable growers, such as climate, soils and soil cultivation, manuring, pests and diseases, food values, etc.

The authors are to be congratulated on having produced an extremely useful book, just at a time when it can very decidedly fill the proverbial " long-felt want ". Everybody who has a garden, whether he has previously grown vegetables or not (and particularly the latter), and whether he intends to make it a hobby of his own (or his mem's) or merely to try to help his " kebun " to do better, should have a copy. This should result in the early need for a new edition, and when this happens there are a few respects in which minor improvements could be made. Some of these are mentioned below, not in any spirit of carping criticism, but in the hope that they may be of use.

Although, as mentioned, there are chapters on Chinese vegetable growing and on vegetable growing in lowland and highland gardens, I often felt that some of the information was rather too stereotyped and bookish, and that if a really successful European amateur vegetable grower could be persuaded to go through

the book and incorporate some of the practical hints and tips which often make so much difference between success and failure in gardening, it would add both to the real value and to the appeal and interest of the book.

The arrangement of the sections dealing with individual vegetables in any chapter is sometimes not very convenient. It is slavishly alphabetical in most cases, so that for instance Chinese radish, ordinary radish and turnips are separated from one another by a variety of less closely related roots and tubers, and similarly while elephant yam and greater yam come together (because e and g are close), the latter is separated from its close relation, the lesser yam, by several other vegetables (because l is further away from g).

The descriptions of some of the vegetables are perhaps rather needlessly technical, or at any rate, they should have been accompanied by a glossary of botanical terms for the benefit of the ordinary reader, who might wish to know what was meant by the statement that " the flowers are produced on axillary racemes ", or " the fruit dehisce by six longitudinal slits ", or " large peltate leaves".

Up-to-date as the book is in practically all other respects, the same cannot be said of certain parts of the chapter on manuring. Calcium cyanamide (which nowadays contains over 20 per cent. of nitrogen, not 18 per cent. as stated) is rightly described as a nitrogenous manure obtained by fixation of atmospheric nitrogen, but this description also applies to sulphate of ammonia, and to many other modern nitrogenous fertilisers which are not mentioned at all, such as Nitrochalk, calcium nitrate, urea, ammonium sulphate-nitrate (Leunasalpeter), and, among " compound " fertilisers, ammonium phosphate manures (Nicifos, Ammophos, etc.), and concentrated fertilisers such as those of the " Enpekay " series. There is no reference to the " compound " manures, consisting of ready-made mixtures of ordinary nitrogenous, phosphatic and potash fertilisers, that are so widely used, and the " unit " methods for their evaluation. These omissions may be of little consequence at the present time when most imported artificial fertilisers are almost unobtainable, but in a book intended for use in more normal times, this chapter should be revised and brought up-to-date, to conform with the high standard of the remainder.

The important subject of composts is treated fully and well, though there might have been an emphatic injunction against the all-too-common habit of the local " kebun " of burning all garden refuse if possible, instead of saving all but diseased or woody refuse for composting. Even if this is not composted in a systematic manner, it can be thrown into a pit or heap and left to rot down on its own, to give the bulky organic manure of which vegetable gardens, especially in the tropics, can scarcely have too much.

The book is right up-to-date in another respect, namely, the application of partial sterilization of soils, to seed and potting composts, in connection with which a most valuable account of the work done at the John Innes Horticultural Institution, by Lawrence and Newell, has recently been published. In my own experience, following their recipes, but using sterilized jungle soil instead of " loam ", and by steam sterilizing in a simple locally-made apparatus (for small quantities a quite useful one can be made from a large oil drum) enormously improved growth of seedlings can be obtained, and one can be practically sure of escaping the heart-breaking disappointments commonly experienced with tomatoes, zinnias and other plants vulnerable to virus diseases, by growing them in such potting composts, in pots, tins, boxes, etc. Incidentally, while it is true that, to get the best results, steam sterilization should not be overdone, the statement that " sterile soil is useless for growing plants " is rather too sweeping.

Some of the information about the uses of Malayan-grown vegetables, of the kind embodied in the pamphlet entitled " How to cook Malayan Vegetables ",

by Ursula Holttum, issued free by the Department of Information and Publicity, Malaya, and embodying the experiences of practising Malayan housewives, could usefully be included. For example, in the section dealing with the local cucumber, there is only the bald statement that it " may be eaten boiled ". Similarly, for the wax gourd or " kundur ", it is stated merely that " the fruit is usually boiled ", This is damning with faint praise. In my experience either of these prolific vegetables, boiled and served in the same way as the vegetable marrow, is a delicious vegetable surpassing the latter in flavour.

The average housewife in Malaya is far too apt to take it for granted that the local vegetables eaten by the Asiatic are not worth serving at her table, and she is usually abetted by her cook, who thinks that the Mem and Tuan would lose face if they ate the same kind of vegetables as their servants, and that because imported or hill-grown vegetables are much more expensive, they are what master ought to eat. It is true that some (but only some) of the local kinds of vegetables are decidedly dull eating, particularly if cooked without any imagination. But many of them can be cooked so as to be delicious. If, in addition, they have been grown in one's own garden, they taste even better ! Imported vegetables from California and elsewhere are often offered for sale at a ridiculous price. In normal times they may be worth it, to those who can afford it, though often they don't nearly come up to expectations. But in war time, with one's own expenses rising and the need to save sterling for buying essential war materials, nobody should reject local vegetables without trial and without trying to have them cooked and served to the best advantage.

Salad vegetables are what cause so many housewives in Malaya the greatest difficulties. Lettuce bought in the market cannot safely be eaten without thorough disinfection and even if it is certain that this has been done properly, much of the freshness and flavour may be spoiled. Hill-grown lettuce is much more expensive, even if it is always hygienic, which may sometimes be a matter of doubt. It is fortunate, therefore, and should be more widely known, that lettuces are among the easiest vegetables of all to grow in one's own garden, either in beds or boxes, and if they are cut and brought in in the early morning, not in the heat of the day, and properly kept, they lack little in crispness and flavour. The article on lettuce growing in this book is particularly informative, and should enable anyone to keep his table amply supplied. And there need be no doubts whether it is safe to eat. Add to this tomatoes grown in steam-sterilised soil, and spring onions also from the garden, and you can have your own home-grown salad in plenty.

Reference is made to growing shallots for use as spring onions, and it is stated : " but local conditions are too moist for it to be a success ". This is quite contrary to my experience, according to which the local " bawang merah ", bought in the market and planted out as sets on light sandy soil (tin tailings) can be used to maintain a constant supply of the succulent (though rather anti-social !) spring onion. On heavier soil, success can still be obtained if the bed is well drained.

" Dig for Victory " should be the motto of every householder in Malaya as well as in Britain. Let him purchase a copy of this extremely useful book, and do so.

H. J. Page.

Notes and Comments.

DAMAGE TO CULTIVATED AREAS BY ELEPHANTS.

Mr. T. R. Hubback contributes an interesting account, with some excellent illustrations, of the habits of the Malayan elephant in the August 1941 number of *The Journal of the Bombay Natural History Society*. The author states :

" In the dense jungle of Malaya it is not easy to observe the habits of wild animals even elephants, and one's knowledge of their lives is bound to be meagre. When hunting them one has plenty of opportunity of learning how they react when frightened and occasionally, if you hunt enough, when they are angry ; but except to know what they are likely to do under certain circumstances, for instance after heavy feeding or when anxious to catch up a herd, one really learns very little about the elephant that lives in a forest.

" But if one takes to the art of photography and tries to get pictures of elephants one then has a chance of learning something about them when undisturbed, when unafraid, and when going about their ordinary occasions. I hunted elephants over a period of thirty-five years, until about five years ago, when age precluded me from further strenuous hunting. So I took up wildlife photography in the Malayan jungle and during the past five years I have learnt more about the normal behaviour of elephants and other large game than I learnt in all the previous years."

So in this article Mr. Hubback writes as an observer, and his long experience entitles him to express authoritative opinions.

He has much to say with regard to the damage done to cultivation by elephants. The animals are frequently hunted with any weapon, however inadequate, resulting in large numbers of elephants being wounded and becoming rogues. His contention is supported by a number of instances within his own experience which are recorded in this article.

In cultivated areas Mr. Hubback recommends a system of patrols as proving effective. He instances evidence before the Wild Life Commission of Malaya in 1930 when witnesses stated that in the Plus Valley of Perak during twenty years of endeavour to deal with elephants that raided estates in that area, 36 elephants had been shot ; the value of rubber trees destroyed by elephants was estimated at £20,000, and there were more elephants than ever.

" However a scheme was inaugurated on the recommendations of the Commission that overcame the difficulties, which as records show was a complete success. The useless killing of elephants ceased. By a system of patrols, the cost of which was met half by the Government and half by the estates, elephants were prevented from reaching the planted area. The result of this action shows that indiscriminate shooting of elephants, as in this case, was not only unnecessary but useless as a complete defence to the menace of marauding elephants. The Plus Valley scheme can well be considered as an example to others who wish to protect cultivation and at the same time preserve wild life.

" Since those days the electric fence has come into use and I have no doubt will prove, when properly erected and looked after, a very efficient check against wandering elephants.

" Where land is given out in isolated blocks in elephant country for, what will most certainly result in, ' fugitive cultivation ', where the main game trails are cut up, and where temporary crops are planted in what might be described as favourite stamping gounds for the larger fauna, there is bound to be trouble from elephants."

The pain and suffering experienced by elephants that have been wounded by indiscriminate shooting and by other ineffective weapons and traps may be gathered by the scars which the author describes ; some of these animals have thus been

wounded many times ; their wounds, in many cases, have precluded them from going long distances in search of their food ; little wonder, therefore, that such animals perforce find an easier way of satisfying their needs by ravaging cultivated crops. It is to be hoped that the easier and cheaper means now available for protecting crops may become more general on estates, and Mr. Hubback's plea for the elephant may not fall on deaf ears.

The problem of protecting the crops of small-holders living in isolated villages presents greater difficulties and still awaits solution.

COCONUT SHELL AND HUSK ASH.

In view of the shortage and uncertainty of supplies of potash fertilizers several coconut estates are preparing both shell ash and husk ash, which are rich in potash and command a price of $3 per ton for 1 per cent. of potash, calculated as K_2O.

The potash contents of the ash from the shell and the husk are about 52 and 44 per cent., equivalent to returns of $156 and $132 per ton respectively.

Figures for the ash content of shell and husk are 0.7 and 2.8 per cent. while the proportions of shell and husk in the freshly-gathered nuts are 16.5 and 31.7 per cent. respectively. Thus, the husk is a much richer source of supply of potash than the shell.

To produce 1 ton of husk ash approximately 63,600 nuts are required ; the shells would yield an additional 282 lbs. of ash. The financial returns would be $132 for the husk ash and about $20 from the shell ash.

If shells alone are burnt nearly 510,000 nuts are required to produce 1 ton of ash.

Further details will be given in the November issue of the Journal.

PROHIBITION OF IMPORT OF COPRA INTO F.M.S.

Gazette Notification No. 3989 published in the *Supplement to the F.M.S. Gazette* of 11th September, 1941, states :

> " In exercise of the powers conferred upon him by section 121 of the Customs Enactment 1936 (No. 5 of 1936) and of all other powers thereunto him enabling the High Commissioner prohibits with effect from this date the importation into the Federated Malay States of any copra."

[F.S. 4462/35 ; D.A. 274/39.]

KAPOK.

Before the war local kapok was in small demand and sales could usually only be effected locally and in small quantities. Now we are told that in some districts the price of floss has risen by more than 100 per cent., and is now worth about $30 per picul. This should be good news to Malays in the riverine areas where trees are plentiful.

RICE POLISHINGS FOR BREAD.

Fine white polishings from the Teluk Anson Government Rice Mill are now being used in bread-making in the proportion of one-third polishings and two-thirds wheat flour. The resultant bread possesses an excellent flavour.

Departmental.

FROM THE DISTRICTS.

Compiled in the Office of the Chief Field Officer from Monthly Reports of Agricultural Officers.

September, 1941.

The Weather.

Adequate rain during the first half of the month gave way to shortages in the latter half in many parts of the country, particularly in the southern areas of the Peninsula. In North Perak, Province Wellesley and Krian, rainfall was well distributed and satisfactory throughout the month.

Crop Reports.

Rubber.—The price of couponed smoked sheet remained steady at around $45 per picul but the value of coupons alone deteriorated further, ranging between 70 cents and $6 per picul equivalent and, as a result, uncouponed rubber showed a further rise over last month's prices. The increased tapping activity reported for August was maintained and in some areas excessive tapping was reported. Shortage of coagulants was general.

Padi.—Good progress in various stages of cultivation, planting and growth was made in those parts of the country which enjoyed satisfactory falls of rain.

In Kedah, rats continued to be troublesome. The crop is well advanced in the north of the Kota Star District where early rain enabled planting to be carried out in advance of the usual season.

Province Wellesley reported some slight flooding in isolated areas but planting has been completed for the most part in the north of the Settlement and also in Penang.

Good progress in planting has been made in Perak during the month and ample water supplies have been available in most areas. Some flood damage occurred in the north of Krian. Excellent growth of 500 acres of hill padi is reported from the Upper Perak District.

At Sungei Manik, Perak, communications have been greatly improved in Stage I by surfacing some paths with railway ash. Planting in this area is nearly completed, co-operative work being much in evidence. In Stage II, planting is well in hand but co-operative work is less common. Planting in Stage III is about half completed, but somewhat uneven in many areas. In Stage IV, mole crickets are reported to be proving a major pest but conditions for growth of the crop are otherwise fairly satisfactory.

In Kelantan, early short-term varieties of padi are coming into flower. Prolonged drought prevented any cultivation of the bulk of the long-term varieties at the beginning of the month but rain at the end of the month improved the situation.

The prolonged and severe drought in Pahang has broken and transplanting is nearly completed in most parts of the State. Increased use of ploughs and harrows is reported from the Raub District.

In Selangor the padi crop is making good growth.

In the areas between Seremban and the coast of Negri Sembilan transplanting has for the most part been completed and weeding is in progress ; some rat damage has occurred in the Jelebu District.

In Malacca growth is reported to be excellent in the Jasin and Alor Gajah areas, giving promise of the best crop in recent years.

Johore suffered from lack of rain but progress in transplanting was fairly satisfactory, though in some parts of the Central Circle many plots have been left uncultivated owing to the greater remuneration offered by rubber tapping at the present time.

In Brunei and Labuan, good progress in cultivation followed timely rain.

Fruit.—Fair crops of durians and rambutans are setting in Province Wellesley and Perak North Circles, but the mango crop in the Krian Circle is unlikely to be good. In the Perak Central Circle there are prospects of a heavy fruit crop, especially of durians and rambutans. Malacca reports the worst fruit crop for some years and in the Pahang North Circle the season, which is now over, has been very poor. From the latter Circle there has been a large export of bananas to Kuala Lumpur, causing some local shortage.

Tobacco.—Prices have fluctuated locally but no great change has taken place in the average price. There has been some increase in planted acreage.

Coconuts.—Prices remained dull but there has been some interest in the production of shell and husk ash for sale to local fertilizer companies. Two new oil mills have come into operation, one at Kuala Kurau, Perak, with an outturn of 80 gallons per day, the other at Batu Pahat Johore, which is producing 800 gallons per day. Production of coconut sugar is receiving some attention in the East Pahang Circle owing to local shortage of cane sugar.

Vegetables.—An increase in planted acreage continues.

DEPARTMENTAL NOTES.

Leave.

Mr. F. Birkinshaw, Chief Field Officer, has been granted 92 days leave from 27th August to 26th November, 1941, both days inclusive.

During his period of leave, Mr. A. E. Coleman-Doscas, State Agricultural Officer, Johore, will act as Chief Field Officer and Mr. J. Fairweather will act as State Agricultural Officer, Johore.

Mr. N. C. E. Miller, Entomologist, returned from leave on 4th August and not 21st August as stated in our last number. He relinquished his special duties in connexion with wheat control and resumed duty of his substantive appointment on 27th August, 1941.

Mr. E. J. H. Berwick, Agricultural Officer, returned from leave on 18th August, 1941.

Mr. V. Dawson, Vice-Principal, School of Agriculture, has been seconded for special duties with the F.M.S.V.F. as from 1st September, 1941.

MARKET PRICES.

September, 1941.

Rubber.—During September there has been no variation in the price of rubber on the Singapore market. No. 1. X. Ribbed Smoked Sheet remained steady at 38 5/8 cents per lb. The New York price was equally stable at 22½ cents gold per lb. whilst the London daily price rose slightly from 13 5/8 to 13 11/16 pence per lb. in the early part of the month.

The average of daily quotations per lb. for the month were therefore, Singapore 38.63 cents, London 13.67 pence, and New York 22.5 cents gold as compared with 38.53 cents, 13.58 pence and 22.55 cents gold in August.

Prices paid for small-holders' rubber at three centres during the month are given in Table I.

Table I.

Weekly Prices paid by Local Dealers for Small-holders' Rubber, September, 1941.

(Dollars per picul of 133 1/3 lbs.)

Grades	Kuala Kangsar, Perak				Kuala Pilah, Negri Sembilan			Batu Pahat, Johore			
	3	10	17	24	4	11	18	3	10	17	24
Smoked Sheet	45.00	44.00	45.06	45.00	45.00	45.25	—	—	43.50	—	—
Unsmoked Sheet ..	40.27	—	42.70	41.52	—	—	43.00	42.03	40.00	42.27	40.63
Scrap ..	—	—	—	—	—	—	—	—	—	—	—

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8 per ton.
Transport from Batu Pahat to Singapore by lorry, excluding duty, 90 cents per picul.
Transport from Kuala Kangsar to Prai by railway $6.20 per ton.
At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.
No purchases at Kuala Pilah on 25th September.

Palm Oil.—No recent information is available regarding prices paid in the United Kingdom for Malayan palm oil.

Local sales of palm oil in seller's drums were made during September at the following prices per ton :—unbleached oil 5 per cent. f.f.a., f.o.b. Singapore $170 ; unbleached oil 5 per cent. f.f.a., c.i.f. Colombo $202.50 ; bleached oil 5 per cent. f.f.a., f.o.b. Port Swettenham $185.

Rice.—The Singapore average wholesale prices of rice per picul in September were as follows :—Thailand 3rd Grade " A " $8.50, Thailand Broken 1st Grade "A" $7.17, Thailand Broken 2nd Grade "A" $6.92, Burma S.Q. Meedone $6.67, Burma Parboiled Milchar No. 2 $5.77. Annam White Rice No. 1 was not quoted.

The July average retail price of No. 2 Thailand rice was not quoted either for Singapore, Penang or Malacca.

The average declared trade value of imports during July was $6.54 per picul, showing no change since June.

Padi.—The Government Rice Mills, Perak, are still paying a guaranteed price of $2.50 per picul for padi, plus a bonus of 10 cents per picul for pure strain S.K. 48 padi.

Table II.

Singapore Prices of Various Agricultural Products.

Product	September, 1941			August, 1941	Average Price 1940
	Highest	Lowest	Average	Average	
	per picul $	per picul $	per picul $	per picul $	per picul $
Copra :					
Sundried	2.90	2.80	2.81	2.66	3.08
Mixed	2.65	2.55	2.56	2.41	2.76
Coconut Oil	..	..	10.50‖	10.00‖	8.29
Copra Cake No. 1	2.55	2.55	2.55	2.55	1.43
No. 2	2.30	2.30	2.30	2.30	‡
Pineapples, Canned :*					
G.A.Q. : Cubes	4.85	4.85	4.85	4.85	4.85
Sliced	4.80	4.80	4.80	4.80	4.80
Tall	4.95	4.95	4.95	4.95	4.95
Golden : Cubes	5.45	5.45	5.45	5.45	5.45
Sliced	5.40	5.40	5.40	5.40	5.40
Tall	5.55	5.55	5.55	5.55	5.55
Coffee :					
Liberian	18.50	18.00	18.40	17.75	16.10
Excelsa	15.50	14.50	14.80	14.75	13.69
Robusta	13.50	12.50	12.80	12.75	8.92
Palembang	22.75	21.00	21.00-22.56	19.13- 21.13	13.00†
Sourabaya	24.00	21.50	21.75-23.56	21.75- 23.88	14.80†
Arecanuts :					
Best	10.75	10.50	10.56	11.40	5.65
Medium	9.75	9.50	9.69	10.60	5.24
Mixed	9.25	8.00	8.96	9.20	4.88
Splits	10.50	5.75	5.81-8.56	10.38- 13.19	6.33†
Red Whole	9.50	5.25	5.37-8.69	13.06- 15.25	6.67†
Sliced	11.50	9.00	9.62-11.75	21.06- 24.75	10.79†
Pepper :					
Singapore Black	8.00	8.00	8.00	8.02½	7.29
Singapore White	17.50	16.50	17.00	16.00	‡
Muntok White	18.00	17.00	17.50	16.55	13.51
Nutmegs :					
110's	27.00	25.50	26.06	27.05	26.11
80's	30.00	26.00	28.00	29.00	30.65
Penang, dried¶	..	..	17.00	17.00	21.00
Mace :					
Siouw	‡	‡	‡	‡	‡
Amboina	55.00	45.00	48.00	53.00	39.85
Penang, dried¶	..	..	50.00	45.00	63.50
Cloves :					
Zanzibar	42.50	42.50	42.50	41.70	‡
Amboina	43.00	43.00	43.00	42.60	‡
Penang, dried¶	‡	‡	‡	‡	72.00
Gambier :					
Block	‡	‡	‡	‡	‡
No. 1 Cube	13.00	13.00	13.00	12.50	15.00
Sago :					
Pearl	8.40	8.35	8.39	8.62½	7.79
Flour, Sarawak Fair	4.75	4.50	4.69	4.85	4.95
Tapioca :					
Flake Fair	10.50	9.00	9.38	8.50	8.08
Seed Pearl	9.50	9.25	9.34	10.48	9.45
Medium Pearl	10.75	10.75	10.75	10.90	9.07

*per case of 48 cans of 1½ lbs. each. ‖ In new drums. ‡ Not quoted. † Highest of the average monthly range quotations. ¶ Penang prices.

Retail prices of padi in cents per gantang (gallon) were as follows : Penang and Province Wellesley 14 ; Perak Central 15 to 20 ; Perak South 14 to 18; Kinta and Batang Padang 18 to 20 ; Kelantan 20 ; Pahang North 18 to 26 ; Pahang South 18 to 20 ; Selangor (coast districts) 14 to 16 ; Negri Sembilan 15 to 22 ; Malacca 16 to 18 ; Johore North 22 to 28 ; Brunei (*kampong*) 15 to 25, (town) 22 to 32 ; Labuan (*kampong*) 23, (town) 26.

Tea.—There are no London tea sales.

The latest Colombo prices available, quoted from *The Ceylon Tea Market Report* of 16th September, 1941, of the Colombo Brokers' Association, are as follows in rupees per lb.: High Grown Rs. 1.39, Medium Grown Rs. 1.18, Low Grown Rs. 1.07.

Cardamoms.—Green cardamoms were quoted in *The Ceylon Chamber of Commerce Weekly Report* of 15th September from Rs. 2.40 to Rs. 2.60 per lb.

Derris.—The freight position for shipments to the U.S.A. is somewhat easier and as a result prices of derris have improved and are likely to continue to do so in the near future. This upward trend has been further encouraged by the fact that the American Government, through its Consulates, is approaching local dealers in order to ascertain the total quantity each dealer could supply and export should the American Government supply the necessary shipping space. Prices in September per picul were as follows: $12 to $13.50 for roots sold on a basis of ether extract; $23.50 to $28 for roots with 4 to 5 per cent. rotenone content, rising to $32.50 to $34 for 7 to 9 per cent. rotenone.

Tobacco.—Prices of prepared tobacco per picul in Kelantan were: 1st quality $130, 2nd quality $110, 3rd quality $100. Prices of dried leaf per picul were as follows: Kedah 1st quality $74 to $76; Penang and Province Wellesley 1st quality $60, 2nd quality $35, uncured $7; Perak Central 1st quality $60 to $80, 2nd quality $50, 3rd quality $30 to $38; Perak South 1st quality $55 to $65, 2nd quality $40 to $60, 3rd quality $30 to $50; Pahang North 1st quality $42 to $90, 2nd quality $32 to $80, 3rd quality $27 to $70, 4th quality $20; Pahang South $45 to $60; Negri Sembilan 1st quality $60 to $70, 2nd quality $50 to $60, 3rd quality $30 to $40, uncured $4 to $6; Malacca $50 to $52; Johore North $25 to $80, prepared tobacco $50 to $200; Selangor cut tobacco $2 to $2.50 per kati.

The above prices are based on London and Singapore daily quotations for rubber, on the Singapore daily prices for copra, on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Guthrie & Co., Ltd., Kuala Lumpur, local palm oil prices by Whittall & Co., Kuala Lumpur, the Singapore prices of imported coffee and arecanuts by Lianqui Trading Company of Singapore, and Singapore derris prices by Hooglandt & Co., Singapore.

1 picul=133 1/3 lbs. The dollar is fixed at 2*s.* 4*d.*

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Trafalgar Square, London, W.C.2.

FERTILIZER PRICES, OCTOBER, 1941.

The following are the prices current for the month of October 1941 of the more important fertilizers of which stocks are available.

	per ton
Nitrate of soda	$185
Rock phosphate (Christmas Island)	40 ($36 Singapore).
Lime	15

Quotations are *ex* warehouse, Port Swettenham, Klang, Singapore and Penang.

Supplies of muriate of potash, sulphate of ammonia, superphosphate, basic slag, calcium cyanamide, sulphate of potash, and rock phosphate (Gafsa) are not available.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS.

(In long tons as declared by Estates.)

Month 1941	Palm Oil			Palm Kernels		
	F.M.S.	U.M.S.	Malaya	F.M.S.	U.M.S.	Malaya
January	1,872.7	1,221.4	3,094.1	170.3	150.0	320.3
February	1,698.3	993.2	2,691.5	167.1	179.3	346.4
March	2,179.8	1,710.1	3,889.9	180.5	274.9	455.4
April	1,993.0	1,870.8	3,863.8	176.3	204.0	380.3
May	1,878.0	2,022.3	3,900.3	95.2	219.0	314.2
June	2,763.7	2,173.9	4,937.6	63.0	214.0	277.0
July	3,164.9	2,611.9	5,776.8	44.7	141.0	185.7
August	3,259.8	2,562.3	5,822.1	18.0	—	18.0
Total ..	18,810.2	15,165.9	33,976.1	915.1	1,382.2	2,297.3
Total January to August, 1940 ..	19,403.3	18,772.8	38,176.1	3,269.1	3,534.1	6,803.2
Total for the year 1940 ..	29,875.2	28,096.9	57,972.1	4,513.1	5,098.1	9,611.2

Stocks on estates as at 31st August, 1941, were: palm oil 4,324 tons, palm kernels 1,853 tons.

MALAYAN AGRICULTURAL EXPORTS, JUNE, 1941.

Product	Net Exports in Tons				
	Year 1940	Jan./June 1940	Jan./June 1941	June 1940	June 1941
Arecanuts	43,915	22,560	21,629	1,957	3,409
Coconuts fresh†‡ ..	131,469†	41,600†	105,993†	6,120†	14,405†
Coconut oil‡	69,446	33,773	40,217	4,369	5,503
Copra‡..	9,904*	11,107	19,833*	8,041	362*
Copra cake	1,215*	4,397	5,955*	198	84*
Gambier, all kinds ..	821	432	171	64*	42
Palm kernels	9,219	4,725	1,700	606	—
Palm Oil	55,990	25,692	23,291	5,974	3,337
Pineapples, canned ..	40,243	27,870	9,524	6,019	779
Rubber¶	549,327¶	260,621¶	287,230¶	44,592¶	49,281¶
Sago,—flour	2,525	3,853	1,527*	2,290	14*
„ —pearl	4,848	1,899	3,491	368	516
„ —raw	4,816*	3,140*	2,278*	331*	524*
Tapioca,—flake ..	762	425	324	1*	45
„ —flour ..	2,649*	1,058*	1,243*	209*	532*
„ —pearl ..	17,004	7,512	10,628	1,011	1,964
Derris	1,258	681	481	134	69
‡Copra equivalent ..	108,468	66,820	47,639	15,262	8,868

† hundreds in number. * net imports. ¶ production.

MALAYAN RUBBER STATISTICS.

Acreages of Tappable Rubber actually Tapped and not Tapped on Estates of 100 Acres and over, for the Month Ending 31st August, 1941.

Area	Estimated Acreages of Tappable Rubber (9)+(11)	Acreages of Tappable Rubber not Tapped				Area of tappable rubber never been tapped (b)		Total area not tapped (3)+(5) (c)		Total area tapped during the month (c)		Area of tappable rubber rested under rotational systems (c)	
		On estates which have entirely ceased tapping		On estates which have partly ceased tapping (a)									
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)	Acreage	Percentage of (9) to (2)	Acreage	Percentage of (11) to (2)	Acreage	Percentage of (13) to (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Straits Settlements—													
Province Wellesley ..	41,973	nil	nil	4,130	9.8	311	0.7	4,130	9.8	37,843	90.2	7,798	18.6
Malacca	108,427	305	0.3	5,419	5.0	663	0.6	5,724	5.3	102,703	94.7	16,905	15.6
Penang	2,720	nil	nil	431	15.8	35	1.3	431	15.8	2,289	84.2	60	2.2
Singapore	28,825	1,859	6.4	4,640	16.1	426	1.5	6,499	22.5	22,326	77.5	1,914	6.6
Total S.S. ..	181,945	2,164	1.2	14,620	8.0	1,435	0.8	16,784	9.2	165,161	90.8	26,677	14.7
Fed. Malay States—													
Perak	269,701	395	0.2	12,195	4.5	2,208	0.8	12,590	4.7	257,111	95.3	30,753	11.4
Selangor	295,729	986	0.4	10,997	3.7	2,281	0.8	11,983	4.1	283,746	95.9	28,628	9.7
Negri Sembilan ..	242,230	1,233	0.5	16,249	6.7	2,912	1.2	17,482	7.2	224,748	92.8	21,168	8.7
Pahang	84,453	870	1.0	5,454	6.5	1,763	2.1	6,324	7.5	78,129	92.5	3,070	3.6
Total F.M.S. ..	892,113	3,484	0.4	44,895	5.0	9,164	1.0	48,379	5.4	843,734	94.6	83,619	9.4
Unfed. Malay States—													
Johore	464,215	5,043	1.1	31,338	6.7	14,545	3.1	36,381	7.8	427,834	92.2	44,126	9.5
Kedah	191,065	3,567	1.9	7,120	3.7	3,877	2.0	10,687	5.6	180,378	94.4	22,348	11.7
Kelantan	30,517	403	1.3	4,564	15.0	983	3.2	4,967	16.3	25,550	83.7	1,892	6.2
Trengganu (d) ..	4,817	nil	nil	nil	nil	nil	nil	nil	nil	4,817	100.0	1,738	36.1
Perlis (e)	1,337	nil	nil	190	14.2	89	6.7	190	14.2	1,147	85.8	274	20.5
Brunei	6,211	nil	nil	1,030	16.6	211	3.4	1,030	16.6	5,181	83.4	764	12.3
Total U.M.S. ..	698,162	9,013	1.3	44,242	6.3	19,705	2.8	53,255	7.6	644,907	92.4	71,142	10.2
Total MALAYA ..	1,772,220	14,661	0.8	103,757	5.9	30,304	1.7	118,418	6.7	1,653,802	93.3	181,438	10.2

Notes :—(*a*) Area out-of-tapping on estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.

(*b*) The acreage shown in column (7) is included in columns (3) and (5).

(*c*) Areas of tappable rubber rested under rotational systems are not considered as out-of-tapping and therefore columns (11) and (12) include columns (13) and (14) respectively.

(*d*) Registered companies only.

(*e*) Figures for the quarter ending 30th June, 1941.

MALAYAN RUBBER STATISTICS. Table I.

Acreage, Stocks, Production, Imports and Exports of Rubber, including Latex, Concentrated Latex and Revertex, for the Month of August, 1941, in Dry Tons.

State or Settlement	Stocks at beginning of month (a)			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres (b)		Imports				Exports (including re-exports)				Stocks at end of month			Consumption	
								During the month		January to August, 1941, inclusive		During the month		January to August, 1941, inclusive						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to August, 1941, inclusive	during the month	Jan. to August, 1941, inclusive	Foreign	From Malay States	Foreign	From Malay States	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to Aug., 1941, inclusive
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Malay States :—																				
F.M.S.	..	10,154	15,107	16,942	127,368	6,140	67,579	Nil	Nil	Nil	Nil	13,523	11,346	106,413	90,412	..	8,210	15,112	152	1,154
Johore	..	5,078	6,434	7,857	60,495	4,387	45,238	Nil	48	Nil	311	2,299	11,303	20,360	84,654	..	3,923	6,279	..	..
Kedah	..	879	4,044	4,076	31,092	1,672	13,302	Nil	Nil	Nil	Nil	1,544	4,603	9,783	35,140	..	899	3,625	..	..
Perlis	..	55	36	22	169	36	271	Nil	Nil	Nil	Nil	Nil	73	Nil	430	..	41	35	..	..
Kelantan	..	449	682	518	3,783	862	5,205	Nil	Nil	Nil	Nil	283	1,202	1,559	7,126	..	362	664	..	..
Trengganu	..	161	159	213	1,655	454	3,275	Nil	Nil	Nil	Nil	Nil	736	20	4,821	..	91	160	..	..
Brunei (g)	..	19	51	76	540	145	914	..	..	..	..	..	189	..	1,396	..	21	81	..	..
TOTAL MALAY STATES	..	16,795	26,513	29,704	225,102	13,696	135,784	Nil	48	Nil	311	17,649	29,452	138,135	223,979	..	13,547	25,956	152	1,154
Straits Settlements :—																				
Malacca	..	2,146	1,485	1,561	12,557	808	7,023	Nil		Nil		2,661		24,378		..	2,369	1,518	..	..
Province Wellesley ..	..	1,622	761	657	4,930	287	2,235	Nil		Nil		12,699				..	2,057	771	..	..
Penang Island ..	5,188	3,955	19	28	208	88	931	694	30,699	10,300	220,846		Nil	94,764	Nil	4,601	3,851	22	..	..
Singapore Island	14,205	18,186	301	206	1,616	170	1,194	19,203		168,832		33,171		287,228		15,524	20,944	298	33	241
Labuan	..	24	Nil	Nil	Nil	18	134	67		516		Nil		Nil		..	20	Nil	..	..
TOTAL STRAITS SETTLEMENTS ..	19,393	25,933	2,566	2,452	19,311	1,371	11,517	19,964	30,699	179,648	220,846	48,531	Nil	406,370	Nil	20,125	29,241	2,609	33	241
TOTAL MALAYA ..	19,393	42,728	29,079	32,156	244,413	15,067	147,301	19,964	30,747	179,648	221,157	66,180	29,452	544,505	223,979	20,125	42,788	28,565	185	1,395

Table II.
DEALERS' STOCKS IN DRY TONS. (c)

Class of Rubber	Federated Malay States	S'pore	Penang	Province W'sly, Malacca, Labuan and Brunei	Johore	Kedah
(22)	(23)	(24)	(25)	(26)	(27)	(28)
DRY RUBBER ..	7,070	20,060	3,479	4,045	2,930	450
WET RUBBER ..	1,140	884	372	422	993	449
TOTAL ..	8,210	20,944	3,851	4,467	3,923	899

Table III.
FOREIGN EXPORTS IN DRY TONS.

Ports	For month	Jan. to August, 1941, inclusive
(29)	(30)	(31)
Singapore ..	40,825	370,264
Penang	15,228	115,818
Port Swettenham	10,127	58,201
Malacca	Nil.	222
TOTAL ..	66,180	544,505

Table IV.
DOMESTIC EXPORTS IN DRY TONS. (d)

Area.	For month	Jan. to August 1941, inclusive
(32)	(33)	(34)
Malay States ..	47,006	361,524
S. Settlements ..	3,677	30,887
MALAYA ..	50,683	392,411

Notes :—(a) Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

(b) For F.M.S. & U.M.S. the production of estates of less than 100 acres is estimated from the formula. Production + imports + stocks at beginning of month = Exports + stocks at end of month + consumption ; *i.e.*, Column (9) = Columns (15) + (16) + (19) + (20) + (21) + (22) − (4) − (5) − (6) − (7) − (11) − (12).
For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.

(c) Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios : unsmoked sheet, 15% ; wet sheet, 25% ; scrap, lump, etc., 40% ; stocks elsewhere are in dry weights as reported by the dealers themselves.

(d) Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands, are represented by sales or exports as shown by cess paid.

(e) All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals ; the latest publication, therefore, is always the most reliable.

(f) The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. & F.M.S., at Singapore on 25th September, 1941.

METEOROLOGICAL SUMMARY, MALAYA, AUGUST, 1941.

Locality	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes								Number of days								
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet	Total	Most in a day Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more		Total	Daily Mean	Per cent.
	°F	°F	°F	*	*	*	*	°F	°F	in.	mm.	*						hrs.	hrs.	
Kuala Lumpur Aerodrome, Selangor	90.4	73.2	81.8					84.3	85.8	5.71	145.0		17	15	5	—	1	183.85	5.93	49
Port Swettenham Aerodrome, Selangor	89.2	72.5	80.9					86.4	87.2	6.45	163.8		15	10	1	—	1	196.70	6.35	52
Sitiawan, Perak	89.5	73.7	81.6					84.7	86.2	5.35	135.9		16	13	4	—	1	209.05	6.74	55
Ipoh Aerodrome, Perak	91.1	73.3	82.2					84.6	85.5	6.11	155.2		16	14	3	—	—	192.25	6.20	50
Temerloh, Pahang	91.5	73.2	82.3					85.8	87.5	15.24	387.1		13	13	6	6	1	202.45	6.53	53
Kuala Lipis, Pahang	89.8	72.9	81.3					84.7	86.0	6.76	171.7		13	11	2	29	—	203.20	6.55	54
Kuala Pahang, Pahang	87.7	74.7	81.2					87.7	88.8	3.11	79.0		10	8	2	—	1	231.00	7.45	61
Kallang Aerodrome, Singapore	86.6	77.6	82.1					83.0	84.6	6.13	155.7		15	13	5	—	—	191.10	6.16	50
Bayan Lepas Aerodrome, Penang	87.2	74.9	81.1					85.1	85.9	12.93	328.4		17	14	—	—	1	175.95	5.67	46
Malacca Town, Malacca	85.2	74.0	79.6					82.8	84.4	13.28	337.3		21	18	4	—	5	189.50	6.11	50
Kluang, Johore	88.0	72.0	80.0					81.3	83.0	5.27	133.9		15	11	5	8	1	174.55	5.63	46
Mersing, Johore	87.1	72.9	80.0					83.2	84.1	4.12	104.6		14	11	2	—	1	187.35	6.04	49
Alor Star, Kedah	87.3	74.4	80.9					85.3	86.4	8.67	220.2		20	18	1	—	—	170.00	5.48	45
Kota Bahru, Kelantan	90.8	74.5	82.7					85.8	86.1	2.37	60.2		10	5	4	—	—	215.05	6.94	56
Kuala Trengganu, Trengganu	89.1	73.4	81.3					84.1	85.9	7.67	194.8		18	13	4	1	—	228.40	7.37	60
Labuan	88.8	77.5	83.1					86.8	87.6	4.50	114.3		12	9	1	—	3	230.15	7.42	60
HILL STATIONS.																				
Fraser's Hill, Pahang 4,268 ft.	75.4	63.2	69.3					73.2	73.1	5.08	129.0		20	14	—	15	2	164.90	5.32	44
Cameron Highlands, Tanah Rata, Pahang 4,750 ft.	72.7	58.0	65.3					71.7	71.2	3.90	99.1		14	14	1	2	—	145.45	4.70	38
Cameron Highlands, Rhododendron Hill, Pahang 5,120 ft.	71.9	60.2	66.1					†	†	3.92	99.6		13	13	—	2	5	160.85	5.19	42

* Restrictions have been placed on the supply of certain types of Meteorological Informations. † Not recorded.